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8.0 SUPPLEMENT TO THE ENVIRONMENTAL REPORT

8.1 Summary

License Termination Plan (LTP) Chapter 8 provides an assessment of the environmental effects of decommissioning Rancho Seco Nuclear Generating Station (Rancho Seco). The assessment determined that the environmental effects from decommissioning Rancho Seco are minimal and there are no adverse effects outside the bounds of NUREG-0586 "Final Generic Environmental Impact Statement (FGEIS) on Decommissioning of Nuclear Facilities," [Reference 8-1] or the associated Supplement 1 [Reference 8-2].

Additionally, the conclusions contained in the "Supplement to Rancho Seco Environmental Report - Post Operating License Stage," [Reference 8-3] used as the original basis for the decommissioning environmental assessment of radiological and non-radiological effects of decommissioning are still valid. These conclusions are summarized as follows:

- The Sacramento Municipal Utility District (District) will maintain annual occupational radiation exposure to individuals as low as reasonably achievable (ALARA). These exposures will be below historical levels for the operating phase of the plant.
- All effluents, both radiological and non-radiological, will remain within regulatory limits as specified in applicable control documents throughout the decommissioning process.
- The District expects to maintain exposure to onsite workers and the offsite public as a result of waste transportation well below the levels projected by NUREG-0586.

8.2 Introduction and Purpose

8.2.1 Purpose

The purpose of this section of the License Termination Plan (LTP) is to update the environmental report for Rancho Seco with new information and significant environmental changes associated with the site's decommissioning and license termination activities. This section of the LTP is prepared pursuant to 10 CFR 51.53(d) and 10 CFR 50.82(a)(9)(ii)(G).

The information contained in this chapter generally follows the Nuclear Regulatory Commission (NRC) guidance of Regulatory Guide 1.179, "Standard Format and Content of License Termination Plans for Nuclear Power Reactors," [Reference 8-4] and NUREG-1700, "Standard Review Plan for Evaluation Nuclear Power Reactor License Termination Plans," [Reference 8-5]. Guidance contained in Supplement 1 to NUREG-0586 was also used during preparation of this chapter. The contents of this section have also been reviewed against the appropriate sections of NUREG-1757 "Consolidated NMSS Decommissioning Guidance Decommissioning Process for Materials Licensees," [Reference 8-7].

Much of the information in this document has also been provided to the NRC in other forms (e.g., Updated Safety Analysis Report and "Supplement to Rancho Seco Environmental Report - Post Operating License Stage").

8.2.2 Background

On November 20, 1967, the District filed an application with the Atomic Energy Commission (AEC) for a provisional construction permit for Rancho Seco, Unit 1. On October 11, 1968, the AEC issued provisional Construction Permit No. CPPR-56.

In March 1973, the U.S. Atomic Energy Commission, Directorate of Licensing issued the Final Environmental Statement related to the operation of Rancho Seco Unit 1. The report concluded that, after weighing the environmental, economic, technical, and other benefits of Rancho Seco against the environmental and other costs and considering available alternatives, the AEC should allow the continuation of Construction Permit No. CPPR-56 and issue an operating license for the Rancho Seco facility. The continuation of the construction permit was subject to the following conditions for the protection of the environment:

1. Implement a comprehensive environmental monitoring program to determine any radiological effects on the environment from the operation of the plant. The monitoring program must include groundwater monitoring.

2. If the environmental monitoring program detects harmful effects or evidence of irreversible damage, provide an analysis of the program and a course of action to alleviate the problem.

3. Provide soil stabilization in disturbed construction areas.

Due to a public vote on June 6, 1989, the District decided to shut down Rancho Seco permanently. Accordingly, on August 29, 1989, the District notified the NRC of its intent to seek amendments to the Rancho Seco operating license and decommission the facility. The NRC acknowledged this notification on November 27, 1989.

Initially, the District selected the SAFSTOR option for decommissioning Rancho Seco. Rancho Seco would remain in SAFSTOR through 2008, at which time the District would begin Deferred-DECON. In accordance with 10 CFR 51.53(d), the District submitted, “Supplement to Rancho Seco Environmental Report - Post Operating License Stage.” This environmental report addressed the actual or potential environmental impacts associated with Custodial and Hardened-SAFSTOR, and provided an initial assessment of the effects of Deferred-DECON.

“Supplement to Rancho Seco Environmental Report - Post Operating License Stage,” compared Rancho Seco decommissioning attributes to those identified in NUREG-0586. NUREG-0586 provides a generic environmental assessment of decommissioning a reference nuclear facility. When the NRC issued the Decommissioning Rule in 1988, and based on the findings in NUREG-0586, it concluded a generic finding of "no significant (environmental) impact." The NRC further concluded that no additional Environmental Impact Statement (EIS) would need to be prepared in connection with decommissioning a particular nuclear site unless the impacts of a particular plant have site-specific considerations significantly different from those studied generically.

The attributes of a prematurely shutdown plant would fall below the "end-of-life" envelope established in NUREG-0586. Although Rancho Seco operated for about 14 years, its reactor had only approximately six full effective power years of operation. Therefore, the irradiated components of Rancho Seco fall within the bounds of NUREG-0586 reference facility that had operated over its 40-year design life.

NUREG-0586, Section 4.0 provides a description of a generic pressurized water reactor (PWR) of a size and rating larger than Rancho Seco. In particular, the reference facility is a 1,175-MWe PWR owned by Portland General Electric and designed by Westinghouse Corporation. The Rancho Seco facility is a 913-MWe PWR designed by Babcock and Wilcox Co. Although the designs of the facilities and Nuclear Steam Supply Systems (NSSS) are slightly different, the B&W design includes the same type of major components, buildings, and structures associated with the reference PWR, and consequently involves the same type of decommissioning tasks and considerations. The Supplement to Rancho Seco Environmental Report - Post Operating License Stage concludes that Rancho Seco falls within the envelope of the generic environmental assessment.

Additionally, in accordance with the California Environmental Quality Act (CEQA), the District conducted an initial study of the potential environmental impacts resulting from closing and decommissioning Rancho Seco. Based on the results of that study, the District staff prepared a Negative Declaration stating that decommissioning would not have a significant environmental impact.

In February 1997, the District began a pilot program called "incremental" decommissioning. Based on the success of incremental decommissioning, the District began full-scale dismantlement in 1999, with the goal of terminating the 10 CFR Part 50 license by 2008. Prior to beginning dismantlement activities, the District conducted another evaluation under CEQA and again concluded that decommissioning would not have a significant environmental impact.

In March 1997, the District submitted its Post Shutdown Decommissioning Activities Report (PSDAR), in accordance with 10 CFR 50.82. The PSDAR superseded the original Decommissioning Plan and provided the information required by 10 CFR 50.82(a)(4). PSDAR Section 4, Environmental Review, provides a discussion of the environmental impacts associated with site-specific decommissioning activities and concluded that all of the decommissioning attributes identified for Rancho Seco are within the envelope of NUREG-0586, except for the decommissioning cost estimate, which is not directly comparable.

In August 2002, the District completed the transfer of all of the Rancho Seco spent nuclear fuel into dry storage at the Rancho Seco Independent Spent Fuel Storage Installation (ISFSI), licensed under 10 CFR Part 72.

8.2.3 Environmental Effects of Decommissioning

A description of both the radiological and non-radiological environmental effects of decommissioning is provided in Section 8.6. Radiological impacts reviewed include evaluations of occupational and public doses, decommissioning accidents, low-level waste (LLW) generation, transportation and disposal, and adherence to radiological criteria for license termination.

The non-radiological effects include potential impacts governed by Federal, State and local regulations. The District used NUREG-0586, Supplement 1 as guidance in evaluating the non-radiological effects of decommissioning. Sections 8.6.3.10 through 8.6.3.12 provide information that addresses the decommissioning impacts on socio-economics, environmental justice, and cultural, historical, and archeological resources.

8.2.4 Overview of Regulations Governing Decommissioning and Final Site Release

Section 8.7 provides a summary of Federal, State, and local regulations governing Rancho Seco decommissioning and final status survey (FSS).

8.3 Site Description After Unrestricted Release

This section presents a summary of the final condition of the site at the conclusion of dismantlement and license termination activities. Chapter 3 of this LTP provides a more detailed description of the final site condition. The impacts of these activities are discussed in Section 8.6.

The District intends to release the Rancho Seco site for unrestricted use in two phases. The majority of the site, including impacted and non-impacted areas, will be released after the completion of the final status surveys for the portions of the site requested to be released. Once an area has been verified as ready for release, no additional surveys or decontamination of the subject area will be required unless the controls (e.g., administrative or engineered) to prevent re-contamination are known or suspected to have been compromised.

Following completion of an FSS survey unit, Rancho Seco staff will compile an FSS report to document areas where remediation tasks are completed and demonstrate that the criteria in 10 CFR 20.1402 are met. The results of these surveys will be documented and submitted to the NRC. Following the completion of the FSS reports for the first phase, the District will submit a license amendment request to release the first portion of the site for unrestricted use.

Since there is currently no disposal site for Class B & C radioactive waste acceptable to the District, the District will continue to store this waste in the Interim Onsite Storage Building (IOSB). After disposing of the Class B & C radioactive waste, the District will complete the FSS for the remainder of the site (i.e., the IOSB) and submit a license amendment request to release the remainder of the site and terminate the 10 CFR Part 50 license.

Chapter 5 of this LTP, Final Status Survey Plan, describes the contents of the FSS report.

The spent nuclear fuel and the greater than Class C (GTCC) waste will remain in storage at the ISFSI[1] until the Department of Energy (DOE) transfers this waste to a federal repository.

8.4 Impacts to the Post-Shutdown Decommissioning Activities Report

In March 1997, the District submitted the Rancho Seco PSDAR to the NRC in accordance with 10 CFR 50.82(a)(7). The PSDAR provides a description of planned decommissioning activities, a schedule for their accomplishment, an estimate of expected decommissioning costs, and the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be in compliance with 10 CFR 50.82(a)(6)(ii). The District intends to decommission Rancho Seco in accordance with the DECON option found acceptable to the NRC in NUREG-0586.

[1] The ISFSI is licensed under 10 CFR Part 72, independent of the 10 CFR Part 50 licensed site.

Chapter 3 of this LTP, Identification of Remaining Site Dismantlement Activities, identifies the dismantlement and decontamination activities that are scheduled to be completed prior to license termination and unrestricted release. These activities are compared to the descriptions provided in the PSDAR and any changes are identified.

Although additional detail regarding major decommissioning activities is available through decommissioning planning efforts, no significant impacts beyond those identified in the PSDAR have been identified. Subsequent sections in this chapter of the LTP provide additional information regarding environmental effects of decommissioning.

8.5 Rancho Seco Site Environmental Description

The Supplement to Rancho Seco Environmental Report - Post Operating License Stage, submitted with the original Rancho Seco Decommissioning Plan, was used as the basis for this supplement to the environmental report. The District reviewed the Supplement to Rancho Seco Environmental Report - Post Operating License Stage to identify any relevant new information or significant environmental changes that would affect the report. The District also reviewed the guidance contained in NUREG-0586, Supplement 1, to determine the nature of any new information to be included in Section 8 of this LTP.

8.5.1 Geography and Demography

8.5.1.1 Site Location Description

The Rancho Seco site is located in the southeast part of Sacramento County, California. It lies either wholly or partly in Sections 27, 28, 29, 32, 33, and 34 of Township 6 North, Range 8E. The site is approximately 26 miles north-northeast of Stockton and 25 miles southeast of Sacramento. The Rancho Seco nuclear reactor unit and ISFSI lie wholly within Section 29.

More generally, the site is located between the Sierra Nevada mountains to the east and the Coast Range along the Pacific Ocean to the west in an area of flat to lightly rolling terrain at an elevation of approximately 200 feet mean sea level (msl). To the east of the site the land becomes more rolling, rising to an elevation of 600 feet at a distance of about seven miles, and increasing in elevation thereafter approaching the Sierra Nevada foothills.

The site area is almost exclusively agricultural and is presently used as grazing land. The climatology of the Rancho Seco site is typical of the Great Central Valley of California. Cloudless skies prevail during summer and much of the spring and fall seasons due to the Pacific anticyclone off the California coast, which prevents Pacific storms from entering inland. The rainy season usually extends from December through March. Atmospheric dispersion factors for the site are considered favorable.

The owner-controlled site is approximately 2,480 acres with all acreage being owned by the District. Within the owner-controlled area is an approximately 87-acre fence-enclosed Industrial Area containing the nuclear facility.

A 30-acre natural gas-fired power plant is approximately one half mile south of the Industrial Area boundary. Also within the 2,480-acre site are:

- The 560-acre Rancho Seco Reservoir and Recreation Area,
- A 50-acre solar power (photo-voltaic) electrical generating station, and

- The 10-acre, 10 CFR Part 72 licensed ISFSI.

Groundwater in the site area occurs under free or semi-confined conditions. It is stored chiefly in the alluvium, the older alluvial type deposits, and the Mehrten Formation. Groundwater movement in the area is to the southwest with a slope of about ten feet/mile.

There is no indication of faulting beneath the site. The nearest fault system, the Foothill Fault System, is about ten miles east of the site and has been inactive since the Jurassic Period, some 135 million years ago.

The soils at the Rancho Seco site can be categorized as hard to very hard silts and silty clays with dense to very dense sands and gravels.

8.5.1.2 Population

The land surrounding the Rancho Seco site is undeveloped and is used primarily for grazing beef cattle and other agricultural activities (e.g., wine grapes). Current land use assumptions indicate that these areas will continue to be used for grazing beef cattle and other agricultural purposes. A five-mile radius area surrounding the Rancho Seco facility is a low population zone. This area is primarily farmland, with few tourist attractions and little seasonal variation in the population.

The nearest population center of 25,000 or more is Lodi, 17 miles south-southwest of the site. Other population centers of greater than 25,000 people include Sacramento at 25 miles, Stockton at 26 miles, and Modesto at 50 miles.

There is currently a housing development under construction approximately 5 miles northwest of the site. The residences are 2-5 acre plots; hence, the buildup is relatively sparse. There is no development projected within a 5-mile radius for the east or south sides of the site. There may be some subdivision of the land to the west of the site with the subsequent buildup of new residences. One to ten acre plots are projected; hence the buildup will continue to be relatively sparse.

Permanent residents are defined as those persons having year-round residences within the described area. Table 8-1 below shows the projected total county population within the three counties that have any portion of the county within a ten-mile radius of Rancho Seco.

Table 8-1
Projected Population Growth[2]

County	2000	2010	2020	2030	2040	2050
Amador	35,434	39,287	42,257	44,404	45,929	47,829
Sacramento	1,230,465	1,555,848	1,946,679	2,293,028	2,579,720	2,858,427
San Joaquin	567,798	747,149	989,462	1,229,757	1,457,128	1,707,599

[2] Source: Department of Finance, Demographic Research Unit, May 2004

8.5.1.3 Land and Water Use

8.5.1.3.1 Land Use

The site area is almost exclusively agricultural. The Rancho Seco Updated Safety Analysis Report (USAR) Figure 2.2-6 provides a detailed description of all agriculture and residential activities within a 5-mile radius of the site. The agricultural activities in the counties lying within the 50-mile radius are shown in USAR Figures 2.2-7, 2.2-8, and 2.2-9.

There are at present three large-scale commercial dairies in the vicinity, each with over 200 cows. The closest dairy is approximately 8 miles northwest of the site. A ranch, within the 2,480 acre site, one mile east of the Industrial Area has dairy cows for domestic use only.

Activities in the area immediately surrounding the site are not expected to change extensively. Proposed land use for the southeast section of Sacramento County is predominantly (70 percent) agricultural and is expected to remain agricultural.

8.5.1.3.2 Access and Egress

As shown in Figure 8-1, State Route 104 (Twin Cities Road) runs just north of the site in a general east-west direction and connects with State Route 99 to the west and State Route 88 to the east. The access road off of Twin Cities Road is the main access road to the Rancho Seco site including the reservoir and the recreation area. The access road is designed to handle heavy construction vehicles and will be maintained during decommissioning. The roadway to the ISFSI terminates at the entrance to the ISFSI Protected Area and will also be maintained during decommissioning.

Rail access to the site is available via a rail spur from the Union Pacific Railroad line that runs roughly parallel to State Route 104 adjacent to the site.

8.5.1.3.3 Water Supply

The District obtains non-potable water for Rancho Seco from the Folsom South Canal. The Bureau of Reclamation constructed the canal as part of the Central Valley Project. A pipeline and pumping station are located between the plant and the Folsom South Canal.

Potable water for the Rancho Seco site comes from four wells. Two of the four wells provide water for use inside the Industrial Area, one well serves the Rancho Seco Reservoir and Recreation Area, and one well serves a residence located at the northeastern corner of the site.

8.5.2 Climate

8.5.2.1 General Climatology

The climate of the Rancho Seco site is generally that of the Great Central Valley of California. Summers are hot and cloudless and winters are mild. The rainy season occurs between October and May with more than two-thirds of the annual rainfall occurring in December through March. Heavy fog occurs in mid-winter, primarily in December and January, and may last for several days. Incidents of severe weather, such as tornados and thunderstorms are infrequent.

The most controlling geographical influence on climate results from the mountains, which surround the valley to the west, north, and east. During the winter, storms that pass through the

area are moderated by the mountains, which collect much of the precipitation. The precipitation that does occur in the valley is usually accompanied by south to southeast winds. The cold north and northwest winds pass over the mountains to the north where the air is warmed dynamically by the descent into the valley resulting in comparatively warm, dry winds. A similar condition occurs infrequently in the summer when a steep pressure gradient develops, producing a pronounced heat wave.

The Central Valley warms greatly during the day resulting in a marked thermal contrast between the valley and the air over the Pacific Ocean. The Coast Range separates the marine air from the valley air except for a gap through the range formed by the Sacramento and San Joaquin Rivers. The heavy marine air flows through this gap and splits into a northerly flow into the San Joaquin Valley and a southerly flow into the Sacramento Valley.

The divergence zone between the two flows usually lies between Stockton and Sacramento near the site. The divergence zone is typically north of the site during the day, resulting in north to northwest winds. As the air in the valley cools, the flow decreases and calm may set in. If the drainage from the Sierra Nevada is sufficient, the winds may shift to southeasterly and increase in speed.

During the hottest mid-summer months, light westerly winds may persist all night. During the winter, the synoptic gradients prevail much of the time and the wind trajectories over the Sacramento-Stockton-Rancho Seco region are reasonably uniform.

The wind flow regime in the Sacramento-Stockton area is governed by two major climatic controls:

- The thermally driven marine flow predominate in the summer season, and
- The synoptic-scale pressure gradients of the winter season.

Spring and fall tend to be influenced primarily by thermal gradients.

The usual winter pressure pattern has a strong high-pressure region situated over the great basin and an intense low-pressure area approaching from the northwest. This situation results in a rather homogeneous wind flow from the south or southeast over the Rancho Seco region. Precipitation may accompany these southerly winds.

In the summer, the synoptic-scale pressure gradient weakens, and the thermal gradient between the cooler maritime air and the warm valley air increases. The resultant flow of air pours into the valley from the west diverging into a northerly flow due to the deflecting effect of the Sierra Nevada in the San Joaquin Valley and a southerly flow in the Sacramento Valley.

As the cool maritime air in the valley cools, the flow decreases and low wind velocities may occur during the night. If the drainage from the Sierra Nevada is sufficiently strong, the winds may shift to the north and increase in speed.

The divergence zone usually lies between Sacramento and Stockton near Rancho Seco. Figure 8-2 shows the seasonal wind roses for Rancho Seco, Sacramento, and Stockton showing the seasonal variation of the flow regime. Figure 8-3 shows the yearly wind roses for Rancho Seco, Sacramento, and Stockton. The dominant wind direction is from the west although the wind direction will oscillate from southwest to northwest reflecting the seasonal effects.

8.5.2.2 Extreme Winds

Wind data from Sacramento Executive Airport from 1951 to 1971 were used to conduct an extreme wind probability distribution approximate to the Rancho Seco site. Table 8-2 presents the highest expected wind speed that will be expected for the indicated recurrence interval.

Table 8-2
Expected Extreme Wind Speeds

Return Period (years)	Wind speed (mph)
50	90
100	101
1000	149
10000	169

8.5.2.3 Tornados

Tornados have been recorded in California but with a frequency of only two per year (National Climatic Summary, 1969). They are generally not severe and in many cases amount to little more than a whirlwind that may cause damage to trees and light structures. An examination of newspaper accounts of nine tornados in California indicates that only one may have been accompanied by wind speeds higher than 100 mph.

A geometrical point can approximate the location of a possible tornado strike. The probability of a tornado occurring at a specific point can be estimated by the principle of geometric probability. If two tornados per year are used, the return period for Rancho Seco is approximately 27,855 years. Because the intensity of California tornados is much less than the "classical mid-western types," winds in only one of five of these tornados would be expected to exceed 100 mph.

This information is reasonably confirmed by searches conducted of the National Oceanic and Atmospheric Administration's (NOAA) database, which result in the following information from 1950 through 1995; California, as a whole, averaged 5 tornados per year. This relates to an average of 0.3 tornados per year per 10,000 square miles. The annual average number of strong-violent (F2-F5) tornados in California for the same period is zero (0).

8.5.2.4 Tropical Storms and Hurricanes

The possibility of severe storms in the area can be limited to thunderstorms and tornados. A discussion of tropical storms and hurricanes is not applicable to Rancho Seco.

8.5.2.5 Precipitation Extremes

The precipitation climatology of the Great Central Valley is characterized by a dry season from June through September and a rainy season from October to May. No precipitation records were taken from Rancho Seco but because precipitation is associated with large-scale synoptic systems, the data in Table 8-3 below, taken from the ISFSI FSAR, are believed to be representative of the site.

The annual rainfall occurs almost exclusively in the winter months.

Table 8-3
Precipitation Climatology
Averages (inches)

Month	Sacramento	Stockton
January	3.18	2.55
February	2.99	2.46
March	2.36	2.05
April	1.40	1.14
May	0.59	0.44
June	0.1	0.07
July	0.01	0.01
August	0.02	0.01
September	0.19	0.19
October	0.77	0.63
November	1.45	1.17
December	3.24	2.66
Total	**16.29**	**13.37**

A frequency of occurrence of a given precipitation intensity for Sacramento is presented in Table 8-4 (from the ISFSI FSAR). As stated above, this data is believed representative of the conditions that exist at the site and shows that virtually all of the precipitation falls at a rate of under a quarter inch per hour.

Table 8-4
Precipitation Intensity

Year	Intensity (inches/hour)			
	0.01-0.09	**0.10-0.24**	**0.25-0.49**	**0.50-0.99**
1961	79.5%	17.7%	2.3%	0.5%
1962	81.8%	17.0%	0.8%	0.4%
1963	80.0%	17.8%	2.2%	0.0%
1964	86.2%	11.3%	2.2%	0.3%
1965	89.0%	10.0%	1.0%	0.0%
Average	**83.5%**	**14.6%**	**1.7%**	**0.2%**

8.5.2.6 Snow and Ice Storms

The possibility of severe storms in the area can be limited to thunderstorms and tornados. Snow in the Sacramento area is extremely rare. Most snow that has been observed in the Sacramento Valley occurs in January. Given the lack of significant snowfall in the region, a detailed discussion of snow and ice is not applicable to the Rancho Seco site.

8.5.2.7 Thunderstorms

Thunderstorms, and associated lighting strike, occur infrequently in the area, with the mean number of days per year with thunderstorm activity ranging between five in the Sacramento area to three in the Stockton area.

8.5.2.8 Restrictive Dilution Conditions (Inversions)

Inversions occur in the Great Central Valley as a result of cold air advection near the ground or cooling of the earth causing a cooling of the air near the ground. Cooling occurs at night when there are no low clouds. Both types occur at Rancho Seco with the advection type usually associated with the westerly wind bringing in cool air from the Pacific Ocean.

Temperature inversions at the ground can be expected to occur every night during the summer upwards to several hundred feet. These temperature inversions are the result of the flow of cool maritime air in to the area during the late afternoon and evening hours. During the winter, shallow (a few hundred feet) but intense surface inversions can be expected occasionally during the nighttime hours under light wind conditions.

8.5.3 Geology and Seismology

8.5.3.1 Geology

Information regarding the geology of the site is taken, in part, from the USAR.

Rancho Seco is located about 25 miles southeast of Sacramento, California in the low foothills of the Sierra Nevada Mountains. The site is founded on the Pliocene Laguna Formation and is underlain by an estimated 1,500 to 2,000 feet of Tertiary or older sediments deposited on a basement complex of granite to metamorphic rocks. Field exploration included:

- 1,552 feet of bucket auger holes logged in detail,
- A 602 foot core hole visually and geophysically logged,
- 2,016 feet of small-bore hole borings that were logged and from which, soil samples were taken for laboratory analysis, and
- Approximately 11,500 feet of geophysical refraction profiles.

The resulting data from this exploration strongly indicate a lack of faulting below the Rancho Seco site.

8.5.3.2 Seismology

Information regarding the seismology of the site is taken, in part, from the USAR.

There are no indications of faulting below the site. The nearest fault, located approximately 10 miles to the east of the site, is the Foothill Fault System. This system has been inactive since the Jurassic Period, some 135 million years ago. The nearest active faults, located over 70 miles to the west, are the Hayward and San Andreas.

A search of the USGS database for earthquakes with intensities greater than IV on the modified Mercalli scale (Richter scale 4.0 or larger) within a 200-mile radius of the plant resulted in 846 such events.

The largest event was the 1989 Loma Prieta earthquake (Magnitude 7.1), Modified Mercalli IX, 99.42 miles (160 km) distant and the nearest was a magnitude 4.3, Modified Mercalli V, quake, 45.36 miles (73 km) from the site.

Restricting the search criteria to a 50-mile (80.5 km) radius results in only three monitored events. These results, along with the geographical positioning of the site, aerial photos, and mapping of the facility are included in Appendix D of the Historical Site Assessment.

8.5.4 Hydrology and Hydrogeology

8.5.4.1 Hydrology

Information regarding the hydrology of the site is taken, in part, from the USAR.

The plant site's rolling terrain is not directly intersected by any streams; however, drainage from higher levels is well defined and intercepts with runoff streams at lower levels. Runoff from the site drains into an un-named "No-Name" creek, which in-turn empties into Clay creek. Clay creek empties into Hadselville creek. Hadselville creek then empties in turn into Laguna creek south, Cosumnes River, Mokelomne River, Sacramento River and finally into the Pacific Ocean via the Delta.

Within recent historical times no flooding or inundation from storms or runoff has occurred within the site boundaries. It is highly unlikely that the site could be flooded, even with abnormal rainfall intensities.

Since the commencement of operations in 1974, the only significant change in regional land use had been the conversion of several sections of land near the facility from grazing to grape production. An additional change of some note would be the population expansion that has occurred in the communities of Galt and Ione, California. According to the City of Galt Housing Needs Assessment, Administrative Draft, October 2001, the population of this historically- agricultural community, located between 10 and 15 miles from the site, doubled from 1990 to 2000 and the number of residential properties nearly doubled to almost 6000 units. While notable, the Ione expansion has not been as dramatic.

Surveys conducted by the County of Sacramento indicate that the land adjoining the site, within at least a 15-mile radius, will remain primarily for agricultural and grazing use; therefore, the rainfall runoff factors will remain constant and not cause any difference in the hydrological properties of the region.

Within this 15-mile radius, seven reservoirs or lakes of note exist. These include small, private impoundments for agricultural use (i.e., Arroyo Seco and Wallace – under 3,000 acre feet) and moderate, municipal reservoirs for recreation and domestic, municipal usage (Comanche and Pardee reservoirs and Lake Amador – up to 435,000 acre feet).

8.5.4.2 Hydrogeology

The following information regarding the hydrogeology of the site is taken, in part, from the USAR. Chapter 2 of this LTP contains updated information based on hydrogeological studies conducted as part of site characterization.

Ground water in the area is found at depths generally greater than 100 feet in the sediments of the Laguna and Mehrten Formations. The sand and gravel zones of these formations yield water readily to wells predominately west of the facility in the Central Valley. At the site however, the formations are less permeable, and the Laguna Formation is above the water table. Depth to water in the vicinity of the site is approximately 150 feet.

Ground water flow is generally to the west. West of the site the flow is affected by a conical depression resulting from the ground water pumping center to the Southwest near the town of Galt, California. (Figure 8-4)

Water from the Laguna and Mehrten formations is of generally good quality in the vicinity of Rancho Seco. It is a sodium bicarbonate-type with low total dissolved solids, generally less than 200 ppm. Potable water for the Rancho Seco site comes from four wells producing from the Mehrten formation at a depth interval of 200-350 feet. Two of the four wells provide water for use inside the Industrial Area, one well serves the Rancho Seco Reservoir and Recreation Area, and one well serves a residence located at the northeastern corner of the site.

Studies performed during the initial sighting evaluation and documented in the USAR, as well as several conducted since the commencement of operations (Geotechnical Investigation for Proposed Evaporation Ponds, ERPT-C0104, Rev.1 and the Final Engineering Report Assessment of Spent Fuel Liner Leakage, ERPT-M0221, Rev.0, 1990), indicate that the permeability of the site soils result in infiltration rates (from several hundred to several thousand years) that effectively preclude any radiological impact on the aquifer or the closest well to the site by the facility.

8.5.5 Biota

8.5.5.1 Ecology of the Site

The site is located at the eastern edge of the Central Valley grassland in the vegetation type known as the California prairie or the California annual grasslands. These grasslands are part of the complex of plant communities that evolve in seasonally hot and dry climates dominated by maritime influences.

Such community complexes were first described for the eastern Mediterranean basin and are consequently called Mediterranean-type ecosystems. The Rancho Seco grassland is a fairly typical Mediterranean-type annual grassland, both with respect to important physical parameters and the limited evidence on ecosystem structure and function.

The gently rolling topography characteristic of the site stretches along the low foothills to the northwest and southeast. To the west, the grassland continues onto the flat alluvial plain of the Central Valley floor less than four miles away. Since the site is so severely water-limited, nearby areas having abundant water may be particularly important sources of immigrant species, which are either accidental or temporarily resident in the Rancho Seco region. Examples of such areas

include the Sacramento - San Joaquin Delta, 20 miles to the northwest, and the Folsom and Comanche Reservoirs, 27 miles to the north and 10 miles to the southeast, respectively.

The Rancho Seco grassland ecosystem appears to be the same as other sections of grazed annual grassland along the east side of the Central Valley, except for the large areas of vernal pools found about one and a half to two miles to the south and east of the power plant.

8.5.5.2 Vegetation Patterns at Rancho Seco

Like other annual grasslands, the vegetation growth in the area surrounding Rancho Seco is highly seasonal and limited by annual precipitation. Its productivity is a function of variation in rainfall, which in turn affects soil moisture and ultimately the length of the growing season. In addition, the combined stress of high temperatures, strong solar insolation, low atmospheric humidity, and low soil moisture force the grassland into dormancy during the summer season (approximately May to October).

The Rancho Seco grassland has the additional stress of cattle-grazing. In the final analysis, the grassland is essentially a cow pasture, in which the dual effects of energy removal by grazing and cover reduction limit the diversity of both the flora and the fauna.

Although the vegetation of the Rancho Seco area is basically all annual grassland, it is not homogeneous. A number of local associations are discernible.

The Upland Annual Grasslands is distinguished as land which is relatively well drained, not containing areas of standing water, and dominated by grasses and forbs (broad-leaved plants) characteristic of annual grasslands.

The vernal-pool areas correspond to the extent of hardpan soil. The vernal-pool areas, generally about one and a half to two miles to the southeast and east of the site, consist of rolling topography underlaid by hardpan. Winter rains fill the depressions to begin the annual cycle of vernal-pool development. The plant species of vernal pools are quite unique to this kind of habitat, and the vernal pools tend to retain their unique character except when insufficient rainfall allows typical annual grassland species to successfully invade the vernal pool areas. Often vernal pool basins will remain bare or have only a few non-vernal species during the dry season.

8.5.5.3 The Fauna of Rancho Seco

The list of vertebrate species that could potentially occur in the Rancho Seco area is quite long. Mouse burrows and meadow-vole (*Microtus californicus*) runs are common, especially where there is cover and where water is nearby. Pocket gophers (*Thomomys bottae*) are the most common mammal on site. Cattle grazing reduces low ground cover that is valuable to common species such as jack-tailed rabbit (*Lepus californicus*) and California quail (*Lophortyx californicus*).

Skunk and raccoon signs are seen near water. Several species of water-fowl, including geese, are common. Grassland birds (savannah sparrows, Brewer's blackbirds, meadowlarks and horned larks) and various raptors (red-tailed hawks, turkey vultures, sparrow hawks) are sighted frequently. The most important natural consumer is the gopher (*Thomomys bottae*), but cattle pastured by man are the most important faunal species affecting the vegetation.

The cattle are the dominant consumers. The next largest herbivore is probably the jackrabbit; the site is not a suitable deer habitat, because of the lack of browse and cover.

Feral cats are numerous and may be the dominant carnivores, especially on smaller ground-nesting birds.

The fauna is probably most diverse during the winter and early spring. Many migratory bird species use the area during the late fall and winter, but leave during the spring to breed in other areas. Populations of the resident species, especially the mammals, can be expected to fluctuate seasonally from high densities near the end of the growing season to low densities at the end of the dry season.

The major limitation on the diversity of fauna in the grassland is the extremely simple structure of the vegetation, consisting almost solely of short, close-cropped grasses and forbs. The lack of tall, herbaceous and shrubby vegetation makes the area unsuitable for species requiring this type of vegetation for foraging, nesting, roosting, or resting sites.

The species in the Rancho Seco grassland are generalist feeders, well adapted to disturbance, and in general not dependent upon heavy cover. Species that are sensitive in one way or another are restricted to a few suitable areas, principally near the reservoir, ponds, or streams.

These observations reaffirm impressions of the substantial impact of the cattle upon the natural faunal elements of the ecosystem.

The Rancho Seco ecosystem, as water-limited as it is, has responded strongly to the additional water resulting from the operation of Rancho Seco. Riparian elements are invading areas where year-round moisture is available, and a number of waterfowl/wading-bird species are using the area. These elements are expected to use the ecosystem seasonally, coinciding with the vegetative growth cycle, and to provide interchange between Rancho Seco, the Delta, and other aquatic habitats.

The fish fauna of the reservoir is entirely introduced and heavily managed. The role of the fish and the reservoir as part of the trophic web of the Rancho Seco grassland has not been clarified, although the lake itself provides an important riparian ecotone that probably increases use of the grassland, particularly by birds.

8.6 Environmental Effects Of Decommissioning

The principal environmental effects of decommissioning activities are radiation exposure and the disposal of radioactive waste. Decommissioning Rancho Seco has had a minimal and insignificant adverse environmental impact. The beneficial impacts include eliminating the problems associated with a radioactively contaminated facility.

The adverse effects associated with decommissioning include routine occupational radiation exposure and the commitment of land for radioactive waste disposal. As discussed in Supplement 1 to NUREG-0586, radiation exposure to the public is small, even when accidental airborne radioactive releases are considered. The low probability, worst-case exposure to an individual from an accident involving a truck transporting radioactive waste to a disposal facility is small.

8.6.1 Radiological Impacts of Decommissioning

During decommissioning, Rancho Seco continues to implement its Radiological Controls Program. The objectives of the Radiological Controls Program are to control radiation hazards, avoid accidental radiation exposures, maintain worker Total Effective Dose Equivalent (TEDE) to less than 5 rem/year, and maintain doses to workers and the public ALARA. The philosophies, policies, and objectives of the Radiological Controls Program are based on federal regulations and associated regulatory guidance.

The Rancho Seco ALARA program is implemented in accordance with 10 CFR Part 20, Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable," [Reference 8-10] and Regulatory Guide 8.10 "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable," [Reference 8-11]. The ALARA policy states management's commitment to maintain exposures to workers and the public ALARA. This commitment is contained in the Defueled Safety Analysis Report (DSAR) and is implemented by plant administrative procedures and Radiation Protection Department implementing procedures.

Supplement 1 to NUREG-0586 provides estimates of occupational radiation dose for various periods of SAFSTOR after reactor shutdown. The dose estimate for immediate dismantlement is 560 - 1,000 person-rem. The dose estimate for 10 years of safe storage is 480 - 667 person-rem.

Rancho Seco shutdown permanently in June 1989, and remained in SAFSTOR until February 1997, when the District began "incremental" decommissioning. Hence, Rancho Seco was in SAFSTOR for nearly eight years.

The most significant contributors to occupational doses from remaining dismantlement activities include segmenting, packaging, and shipping the reactor vessel internals and reactor vessel.

8.6.2 Offsite Radiation Exposure and Monitoring

The District is committed to decommissioning Rancho Seco in a manner that will ensure adequate radiation protection to employees, contractors, and the public. Accordingly, the District implements the Radiological Environmental Monitoring Program (REMP), which provides an accurate assessment of the radiological environment in and around the environs of the Rancho Seco site.

Exposure pathways are analyzed through a systematic process that identifies a sample medium or organism that is found in the effluent pathways. The analysis of the effluent and exposure pathways enables the selection of sampling and monitoring locations that fall into one of two classes, those that are, and those that are not, influenced by effluent pathways. Those in the pathways are referred to as indicator locations. Several of the unaffected locations are selected to represent baseline or control locations.

Indicator locations provide data from the surrounding environment that may be influenced by plant decommissioning because they are nearby, downwind, or downstream of the release pathway. Such data can be used to calculate doses to verify compliance with 40 CFR Part 190, using methodology contained in the Offsite Dose Calculation Manual (ODCM).

Control sample locations provide data that should not be influenced by decommissioning Rancho Seco. These locations are selected based upon the distance from the plant, being upwind, or upstream of the release pathways. Data from these locations help discriminate between Rancho Seco releases and other natural or manmade events that may impact human exposure.

At Rancho Seco, potentially radioactive liquid effluent is discharged into Clay Creek. A continuous flow of Folsom South Canal water is released above the discharge point. The continuous flow and the liquid effluent release are the major effluent release pathway, and thus the exposure pathway during decommissioning.

Prior to the minimum release rate being established, Clay Creek was a seasonal stream, formed as the confluence of three and one half square miles of drainage runoff upstream of the site. The now-continuous flow of Clay Creek intersects Hadselville Creek north and west of California State Highway 104. Hadselville Creek intersects Laguna Creek just east of the Folsom South Canal. Laguna Creek flows into the Cosumnes River approximately 20 miles from Rancho Seco.

Hadselville and Laguna Creeks are also seasonal streams and also receive irrigation runoff during periods when irrigation is used. These streams are the major release pathways for liquid effluents from the site.

The gaseous pathway analysis is subject to the meteorological conditions during the time of the release. While not a significant release or exposure pathway, routine air sampling is performed to determine the dose due to radioactive gaseous releases.

The direct radiation exposure pathway is measured continuously with the use of passive monitoring devices. The dose is integrated over three months to accumulate a statistically significant exposure. The majority of the dose is delivered from naturally radioactive elements in the surface of the Earth. A smaller fraction of the dose is delivered by cosmic radiation that has penetrated the Earth's atmosphere.

The environmental effects of radiation dose and radioactivity in effluents released to the environment during safe storage and decommissioning have been substantially less than the environmental effects during reactor operation.

According to NUREG-0586, the radiation dose to the public from the truck transport of radioactive wastes during preparation for SAFSTOR is estimated to be about 2.1 man-rem, and that from the truck transport of radioactive wastes during Deferred-DECON after 10 years of storage is estimated to be about 0.5 man-rem.

Calculated radiation doses to the maximum-exposed individual from postulated accidental airborne radioactivity releases during decommissioning activities are considered low. Based on the most severe transportation accident scenario, NUREG-0586 calculated the radiation dose to the maximally exposed individual to be 24 rem (50-year dose commitment) to the lungs. The frequency of such an accident was conservatively estimated to be 5.7E-4 for the SAFSTOR period.

The design bases for the ISFSI precludes airborne radioactive releases during spent fuel storage and provides adequate shielding to minimize exposure. Radiation monitoring for the ISFSI is performed in accordance with the Rancho Seco Radiation Protection Program. Under a worst case scenario, where there is total loss of the confinement barrier, projected doses at the site boundary

are substantially below the limits established in 10 CFR 72.106(b). Exposure from the ISFSI to the nearest permanent resident will not exceed 25 millirems per year as specified in 10 CFR 72.104 and 40 CFR Part 190.

8.6.2.1 Environmental Effects of Accidents and Decommissioning Events

The Rancho Seco Decommissioning accident analysis is part of the Rancho Seco licensing design basis.

While decommissioning radioactively contaminated structures, systems, and components at Rancho Seco, it is necessary to assure the safety of the public in the surrounding area and workers. Worker safety is addressed in the Rancho Seco Radiation Protection Program, which relies on ALARA principles and the Rancho Seco Safety Program, which is defined in the Rancho Seco Safety Manual. The safety of the public is principally related to potential hazards associated with an airborne release of radioactive materials during decommissioning operations.

During decommissioning the District will perform decontamination and dismantlement of structures, systems, and components in addition to maintenance, waste management, and surveillance. The accidents discussed in Supplement 1 to NUREG-0586 associated with immediate dismantlement would be applicable during decommissioning at Rancho Seco. However, the potential consequences associated with these accidents would be less because of a reduction in the Rancho Seco radionuclide inventory due to:

- Decontamination efforts made before decommissioning,
- Prior radioactive waste shipments, and
- Radioactive decay.

Therefore, the potential decommissioning accidents at Rancho Seco are bounded by the accident evaluation specified in Supplement 1 to NUREG-0586.

Operational accidents during decommissioning could result from equipment failure, human error, and service conditions. With spent fuel removed from the plant, operational accidents during decommissioning may be categorized as follows:

- Radioactive waste transportation accidents,
- Explosions and/or fires associated with explosive and/or combustible materials,
- Loss of contamination control,
- Natural phenomena, and
- Human caused events external to Rancho Seco.

These potential operational accidents during decommissioning are addressed in Supplement 1 to NUREG-0586 for immediate dismantlement. Therefore, for decommissioning Rancho Seco, the associated potential accidents are bounded by the Supplement 1 to NUREG-0586 evaluation.

8.6.2.2 Decommissioning Low-Level Radioactive Waste (LLRW)

Decommissioning Rancho Seco has required the disposal of large volumes of radioactive and non-radioactive materials to allow for the release of the site for unrestricted use and license termination. Materials that cannot be free-released are processed as radioactive waste. Rancho Seco ensures appropriate processing, packaging, and control of solid, liquid, and gaseous radioactive wastes through the Process Control Program and associated implementing procedures.

Given the smaller size of Rancho Seco compared to the reference PWR in NUREG-0586 (913-MWe vs. 1,175-MWe) and its limited operational life, the volume and total quantities of radioactive waste requiring disposal are significantly less than those assumed in NUREG-0586. LTP Section 3.4.3 provides an estimate of the amount of radioactive material to be shipped for disposal or processing.

The majority of Rancho Seco radioactive waste was shipped to Energy*Solutions*[3] for disposal. Some radioactive waste was shipped for processing. As of December 31, 2005, Rancho Seco has shipped 196,325 ft^3 (5,560 m^3) of radioactive waste to Energy*Solutions*.

Due to the current lack of an acceptable disposal site for radioactive Class B & C waste, Rancho Seco will continue to store its Class B & C waste at the IOSB until a suitable site becomes available. The District will store the GTCC waste at the ISFSI until a suitable site becomes available and the DOE removes the waste.

8.6.2.3 Spent Fuel Storage

The District completed transferring all of its spent nuclear fuel to the Rancho Seco ISFSI in August 2002. Decontamination of the loaded transfer cask took place in the Fuel Storage Building before the cask and canisters were moved to the ISFSI. Descriptions of cask decontamination and radioactive waste treatment processes are provided in Chapters 5 and 6 of the Rancho Seco ISFSI FSAR. The fuel will remain in storage under the Part 72 license until the DOE develops a permanent repository.

The ISFSI does not generate any gaseous, liquid, or solid radioactive waste. No hazardous chemicals are used during its operation.

8.6.2.4 Radiological Criteria for License Termination

Following decommissioning, residual radioactivity will be limited to allow release of the property for unrestricted use such that the average member of a critical group working on the site would not be expected to receive a TEDE dose greater than 25 mrem/year from all applicable combined environmental exposure pathways. Chapter 2 of this LTP, Site Characterization, Chapter 5, Final Status Survey Plan, and Chapter 6, Compliance with the Radiological Criteria for License Termination, provide the methodology for achieving unrestricted site release.

[3] Energy*Solutions* was previously Envirocare of Utah

8.6.3 Non-Radiological Environmental Impacts

The following subsections provide an assessment of the non-radiological impacts of decommissioning and site release. NUREG-0586 Supplement 1 was used as the basis for identifying potential environmental impacts and determining the significance of these impacts.

8.6.3.1 Onsite / Offsite Land Use

The 2,480-acre Rancho Seco owner controlled area contains the following features:

- An 87-acre fence-enclosed Industrial Area,
- A 560-acre Rancho Seco Reservoir and Recreation Area,
- A 50-acre solar power generating station,
- A 10-acre ISFSI,
- A 30-acre, 500 MWe gas-fired power plant, and
- The Rancho Seco switchyard (major intertie with the Western Grid – six transmission lines and switchyard).

The District will retain ownership of the site indefinitely.

There have been no significant changes in onsite land use as the result of decommissioning Rancho Seco. Laydown areas, parking lots, office buildings, and other onsite facilities that were used during plant operation were adequate to support decommissioning activities. No additional land was disturbed to support decommissioning.

The District removed major components of primary and secondary plant systems (e.g., the pressurizer, steam generators, reactor vessel internals, etc.) without any significant changes in onsite land use. Specialized equipment (e.g., cranes, heavy lifting equipment, etc.) was brought in as required. The District performs packaging and storage of low-level radioactive waste in accordance with existing administrative procedures using existing facilities and equipment.

There was no offsite land used for decommissioning except for the use of a local landfill for the disposal of non-radioactive waste or recycling of non-radioactive scrap metal.

8.6.3.2 Water Use

In 1970, the District constructed Rancho Seco Lake to serve as a back-up water source for the plant. This 165-acre reservoir was designed to hold a capacity of 2,700 acre-feet. Pumping from the Folsom South Canal, in combination with surface runoff, is designed to maintain a stable volume of water in Rancho Seco Lake. However, drawdowns from the lake have occurred occasionally when required by reduced pumping from the Folsom South Canal.

Rancho Seco Lake served as a back-up water supply for the plant cooling and fire systems. Water for plant use is pumped from Folsom South Canal, located approximately 3.5 miles west of the plant site, through an underground pipeline. The District's contract with the U.S. Bureau of Reclamation commits the District to draw approximately 32 cubic feet per second (cfs) from this source. Decommissioning activities have not affected the District's contract with the U.S. Bureau of Reclamation.

The water supply system (e.g., Folsom South Canal pumping station, lake, interconnecting piping) also provides cooling water to the new Cosumnes Power Plant. Operation of the water system will continue for as long as the new plant is in service. The District has no plans to abandon the water supply system.

Potable water is supplied from groundwater from the site well water system. Groundwater usage is expected to decrease as staffing levels decline throughout the decommissioning process.

8.6.3.3 Water Quality

No significant, long-term impacts on Folsom South Canal have occurred from decommissioning. The District continues to meet the requirements of the Rancho Seco National Pollutant Discharge Elimination System (NPDES) permit.

No adverse impacts on groundwater are anticipated from specific decommissioning activities.

8.6.3.4 Air Quality

Agencies involved in air pollution control in Sacramento County include the Air Resources Board and the Sacramento Metropolitan Air Quality Management District (SMAQMD). The District will comply with all applicable air quality regulations, including the requirements of SMAQMD.

Fugitive dust is generated from the various decommissioning activities including the removal of buried piping and from soil excavation to remove components such as underground utilities or potentially contaminated soils. The primary cause of health problems associated with suspended particulate matter is with particles that are small enough to reach the lungs when inhaled. Reasonable control measures, such as the use of wet suppression, are used to minimize the quantities of fugitive dust.

The controlled dismantlement and packaging of site components and structures will preclude fugitive dust from becoming an ambient air quality concern during decommissioning.

8.6.3.5 Aquatic Ecology

Aquatic impacts associated with plant operation were considered to be minimal and the potential impacts associated with the decommissioning process are also minor because plant water usage and discharge quantities are reduced. Therefore, no additional adverse impacts to the aquatic flora or fauna are anticipated from decommissioning activities. Additionally, all applicable NPDES limits will be maintained throughout the decommissioning process.

Prior to authorizing actions that could result in termination or substantial alteration of current water discharges, the District will conduct an assessment of potential effects on the creek environment and maintenance of Rancho Seco Lake. Measures to minimize environmental impacts identified by the District and responsible or trustee agencies will be implemented, as appropriate.

8.6.3.6 Terrestrial Ecology

Since decommissioning activities generally take place in areas of the site that have already been disturbed, there are no anticipated additional impacts to the flora and fauna of the Rancho Seco site.

8.6.3.7 Threatened and Endangered Species

The District has conducted numerous field surveys in the vicinity of the Rancho Seco site. The site was field surveyed for the original development of Rancho Seco, has been surveyed various times recently to develop a mitigation bank for fairy shrimp, and was surveyed in 1994, as part of the Master Plan for development of Rancho Seco Park. Most recently the District has conducted field surveys in support of the license application for the Cosumnes Power Plant located approximately one half mile south of the Rancho Seco Industrial Area.

Although several "special-status" plants and animals have been identified on the Rancho Seco site, very little, if any, land will be disturbed during decommissioning that was not already used during plant operations or original construction. Almost all decommissioning activities are taking place in paved areas within the Industrial Area boundary.

Prior to the start of construction on Cosumnes Power Plant, Rancho Seco staff performed radiation surveys in the grassland area south of the Industrial Area. There were no discernable impacts to endangered or threatened species as the result of these radiation surveys.

8.6.3.8 Occupational Safety

The District is committed to decommissioning Rancho Seco safely. The Rancho Seco Occupational Injury and Illness Prevention Program (IIPP) is intended to effectively control hazards in the work environment and prevent occupational injuries and illnesses. The injuries and illnesses prevention program complies with Cal/OSHA regulatory requirements and provides the basis for controlling safety during decommissioning activities.

The IIPP applies to all District employees working at Rancho Seco facilities as well as visitors and contract employees working under direct District supervision. Contract personnel not under direct District supervision follow their own injury prevention program.

Elements of the Rancho Seco IIPP include:

- Communications,
- Hazard recognition,
- Hazard control,
- Injury and illness investigation,
- Training, and
- Compliance requirements.

The Rancho Seco IIPP establishes and maintains a safe work place for workers, contractors, and visitors through procedures and guidelines to be used to reduce industrial hazards and risks. While decommissioning activities are different from plant operational activities, qualified staff, facilities, and equipment are available to perform decommissioning in a safe and effective manner. Compliance with applicable Cal/OSHA regulations and to the guidance provided

through industry standards and good work practices is a top priority of site management and employees.

8.6.3.9 Cost

Chapter 7 of this LTP, Update of Site-Specific Decommissioning Costs, provides a summary and update of Rancho Seco decommissioning costs.

8.6.3.10 Socioeconomics

The District's original decision to permanently cease plant operations was not subject to NRC review or approval. The economic growth and job opportunities in the Sacramento metropolitan area and the nuclear industry at the time of shutdown minimized the effects of unemployment that could have potentially resulted from decommissioning.

The radiological decommissioning process itself may have various minor effects on the local economy due to changes in the plant's payroll and other types of expenditures. The decommissioning staff has increased, providing jobs and local business opportunities.

Except for solid waste collection and disposal, the decommissioning process will require no additional public services.

Since the District is a municipal utility, it is exempt from paying local property taxes. Accordingly, there is no affect on local tax revenues and services due to Rancho Seco decommissioning.

8.6.3.11 Environmental Justice

High and adverse health, economic, or environmental effects to local low-income and minority populations characterize environmental justice. There is no reason to believe that low-income or minority populations would be affected by Rancho Seco decommissioning.

Since the District will retain ownership of the site, which will continue to be used for District business purposes, environmental justice considerations are not significant for Rancho Seco decommissioning.

8.6.3.12 Cultural, Historical, and Archeological Resources

As part of the original environmental evaluation for the construction and operation of Rancho Seco, Sacramento State College conducted an archeological survey of the Rancho Seco area to determine if there was any prehistoric use of the site. Their survey did not find any archeological sites within the project area nor was there any evidence of prehistoric occupation.

In support of the license application to the California Energy Commission for the Cosumnes Power Plant, the District contracted for additional cultural resources inventories for 220 acres at the Cosumnes Power Plant site (approximately one half mile south of the Rancho Seco Industrial Area). This inventory identified two historical period archeological sites and one prehistoric period archeological resource. Further study is required to determine the significance of these sites.

Decommissioning Rancho Seco has not resulted in disturbing land beyond the Industrial Area and other paved areas of the Rancho Seco site. Accordingly, the impact to cultural, historical, and archeological resources is not significant.

8.6.3.13 Aesthetic Issues

Aesthetic issues associated with decommissioning are primarily visual and relate to the structures and visual attributes of the decommissioning site. The impact of decommissioning, on site aesthetics (e.g., truck traffic, noise, etc.) is limited both in terms of land disturbance and duration (i.e., any impacts are temporary and will cease when decommissioning activities are completed).

The District intends on leaving the major concrete plant structures in place after the completion of decommissioning and license termination. Hence, decommissioning will not significantly change the appearance of the site and the impact on site aesthetics due to decommissioning will not be detectable to the local community.

8.6.3.14 Noise

Shipping low-level waste during Deferred-DECON has had minimal impact on existing transportation systems in the site vicinity due to increased heavy truck traffic. The District completed construction of the ISFSI in 1995, and completed transferring fuel to the ISFSI in 2002. Since the ISFSI is a passive facility, there is no noise generated from the ISFSI.

Noise associated with crane operations and concrete removal is intermittent and temporary and occurs during the daylight hours.

Due to the remote location of the site and by limiting decommissioning activities to normal working hours, the effects of increased noise associated with decommissioning will not be significant.

8.6.3.15 Irretrievable Resources

Irreversible commitments are commitments of resources that cannot be recovered and irretrievable commitments of resources are those that are lost only for a period of time. Irretrievable commitments of resources that could occur during decommissioning include fuel for equipment and transportation of materials to and from the site, rags, solvents, gases, tools, etc. The use of these resources is minimal.

The use of land for the disposal of radioactive and non-radioactive waste is also relatively small. Therefore, decommissioning and dismantlement of the site does not have any additional adverse effect on resources beyond the materials required to construct and operate the facility.

8.7 Overview Of Regulations Governing Decommissioning Activities and Site Release

Decommissioning Rancho Seco requires adherence to numerous Federal, State, and local regulations. Applicable federal, state, and local requirements are identified and reviewed below. The information provided below is intended as a broad overview of applicable regulations and is not intended to be all-inclusive.

8.7.1 Federal Requirements

Decommissioning activities that are subject to federal regulations, permits, licenses, notification, approvals, or acknowledgments include:

- Spent fuel storage at the ISFSI,
- Handling, packaging, and shipment of radioactive waste,
- Worker radiation protection,
- License termination and final site release,
- Worker health and safety,
- Liquid effluent releases,
- Hazardous waste generation/disposition,
- Handling and removal of asbestos,
- Handling and removal of lead paint, and
- Management and closure of mixed LLW storage facility.

8.7.1.1 Nuclear Regulatory Commission

The majority of radiological activities falls under Title 10 of the Code of Federal Regulation (CFR) and are administered by the NRC. Applicable Title 10 regulations include:

- Part 50 - Decommissioning activities,
- Part 20 - Radiation protection,
- Part 51 - Environmental protection,
- Part 61 - Disposal of radioactive waste, and
- Part 71 - Packaging and transportation of radioactive waste (regulations in 49 CFR Parts 171 through 174 also apply).

8.7.1.2 California Occupational Safety and Health Administration

Worker health and safety protection during decommissioning is subject to Cal/OSHA regulations. These regulations include requirements for respiratory protection (non-radiological), hearing protection, illumination, scaffold safety, crane and rigging safety, chemical usage and release response, and cleanup operations.

8.7.1.3 Environmental Protection Agency

The Environmental Protection Agency (EPA) regulations outlined in Title 40 of the Code of Federal Regulations apply as follows:

- Part 61 - Asbestos Handling and Removal,
- Parts 122 to 125 - National Pollutant Discharge Elimination System (NPDES),
- Part 141 - Safe Drinking Water Standards,
- Part 190 - Radiation Protection Standards for Nuclear Power Operations,
- Parts 260 to 272 - Resource Conservation and Recovery Act (RCRA),
- Part 280 - Underground Storage Tanks,

- Part 761 - Polychlorinated Biphenyls (PCBs), and
- Part 129-132 - Clean Water Act.

8.7.2 State and Local Requirements

Permits and approvals from or notifications to state and local agencies are required for safety and environmental protection purposes. Decommissioning activities and related site operations that fall under state and local jurisdiction include:

- Diversion permit from the State Water Resources Board,
- Waste discharge agreement from the Central Valley Regional Water Quality Control Board,
- Agreement with the County of Sacramento regarding the administration, operation, and maintenance of recreational facilities at Rancho Seco Lake,
- Permits from the Army Corp of Engineers to dredge, discharge, or deposit materials into navigable waters or their tributaries, and
- Water quality certification as required under the Federal Water Pollution Control Act.

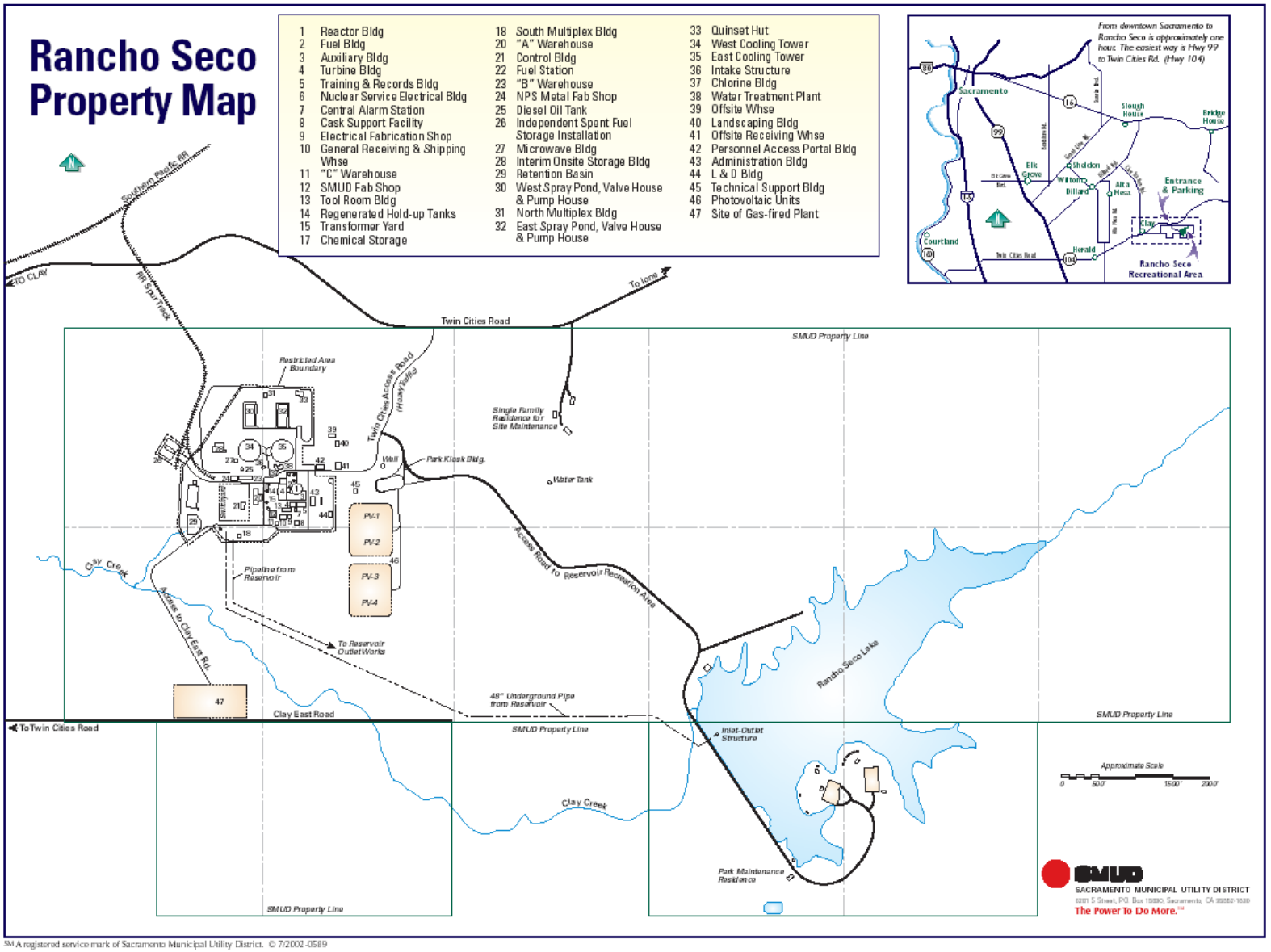

Figure 8-1
Rancho Seco Site Map

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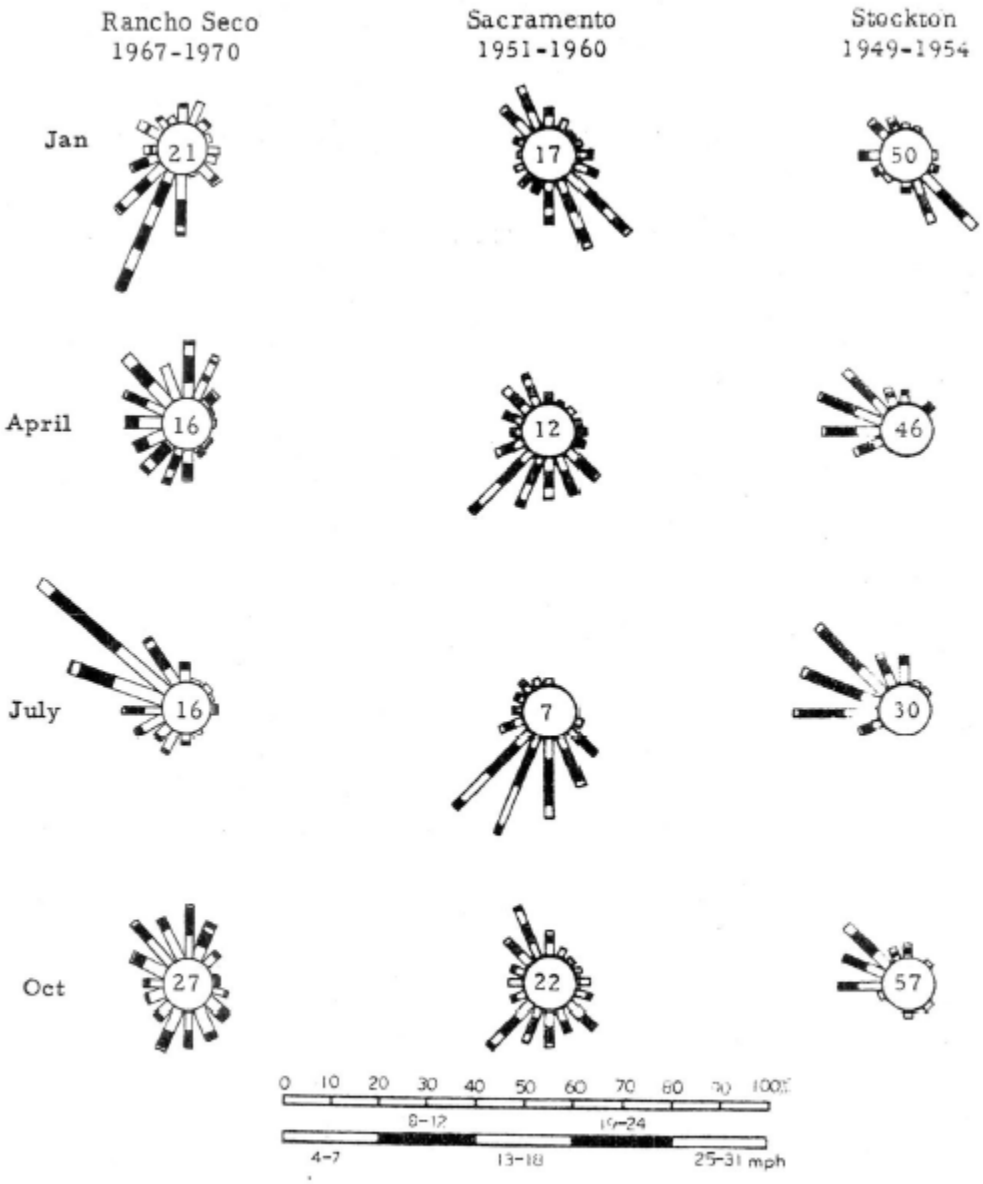


Figure 8-2
Wind Roses

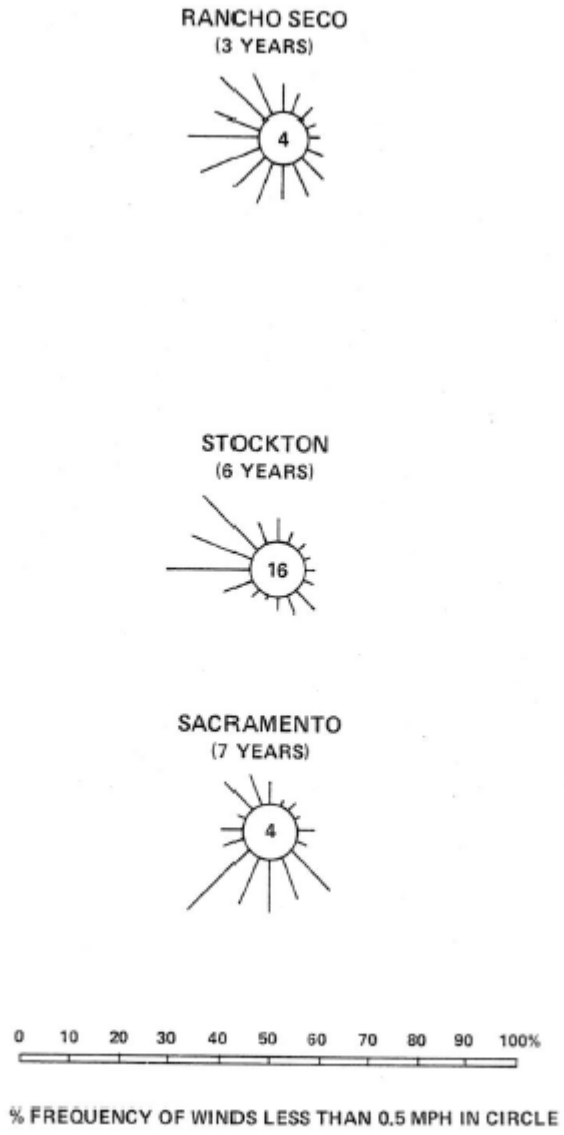
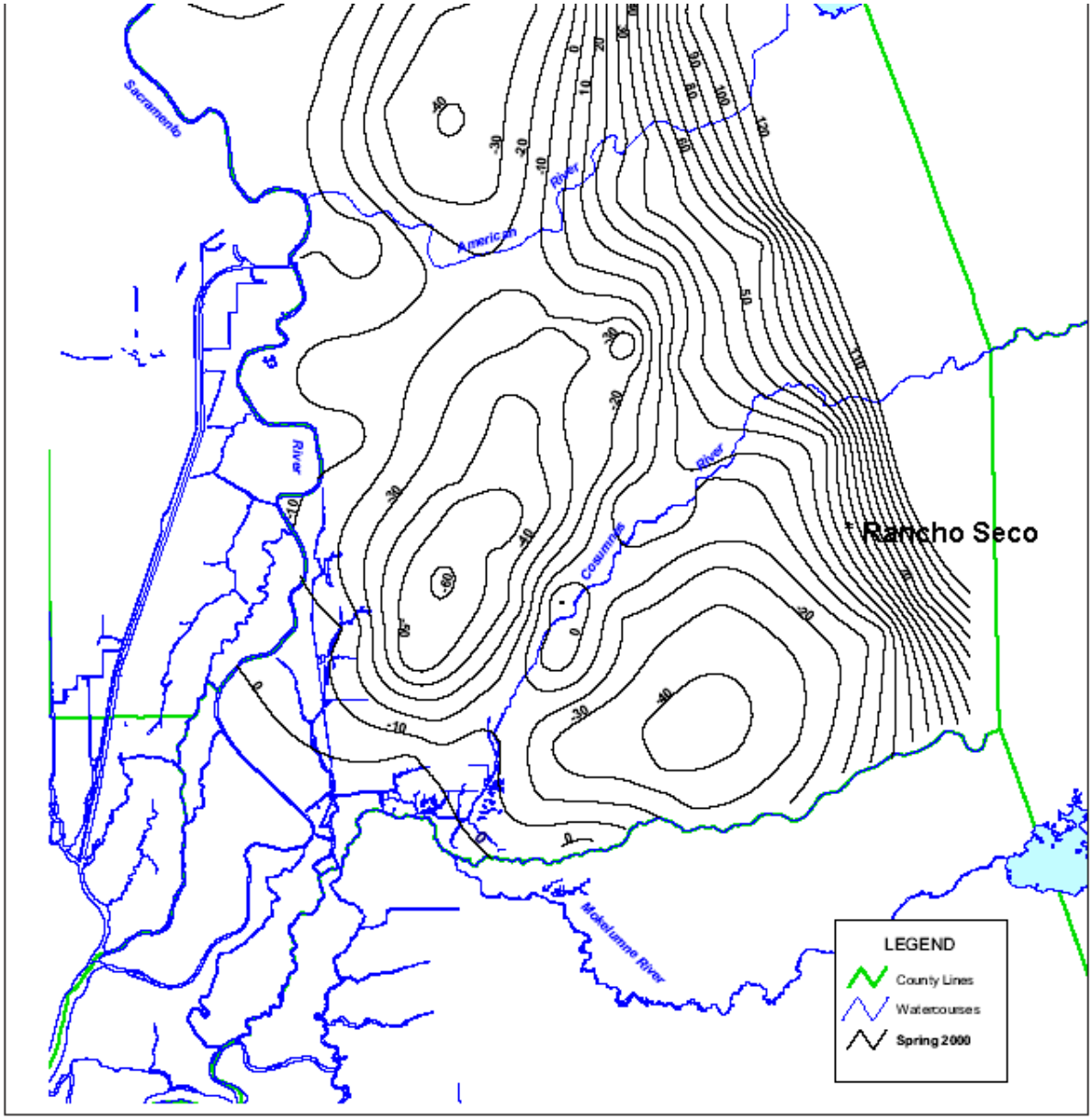


Figure 8-3
Yearly Wind Roses



Source: Based on measured spring 2000 water level data from Sacramento County Department of Water Resources

Contour numbers indicate feet from mean sea level (msl)
Credit: Sacramento County 2002 Zone 40 Water Supply Master Plan EIR

Figure 8-4
Ground Water Contour Map

8.8 REFERENCES

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